MEE427 PID CONTROL ASSIGNMENT # 2

1) Set-Point Weighting

By considering the set point and the process output separately, flexible structure of a PID controller in the form given in Equation 1.

$$u(t) = K(e_p + \frac{1}{T_i}\int_0^t e(s)ds + T_d\frac{de_d}{dt}) \tag{1}$$

where,

$$e_p = by_{sp} - y \tag{2}$$

$$e_d = cy_{sp} - y \tag{3}$$

$$e = y_{sp} - y \tag{4}$$

Having a plant given in Equation 5, construct a PID controller with set-point weights environment with any simulation program so that the effect of the set-point weights (b and c) can be observed. Include the disturbance and noise intervention on the system as well.

$$G(s) = \frac{1}{(s+1)^3} \tag{5}$$

Simulate the system with given coefficients in Equation 6 and reach the simulation results given in Figure 1.

$$\begin{gathered} K = 1 \\ T_i = 2 \\ T_d = 0.5 \\ c = 0 \end{gathered} \tag{6}$$

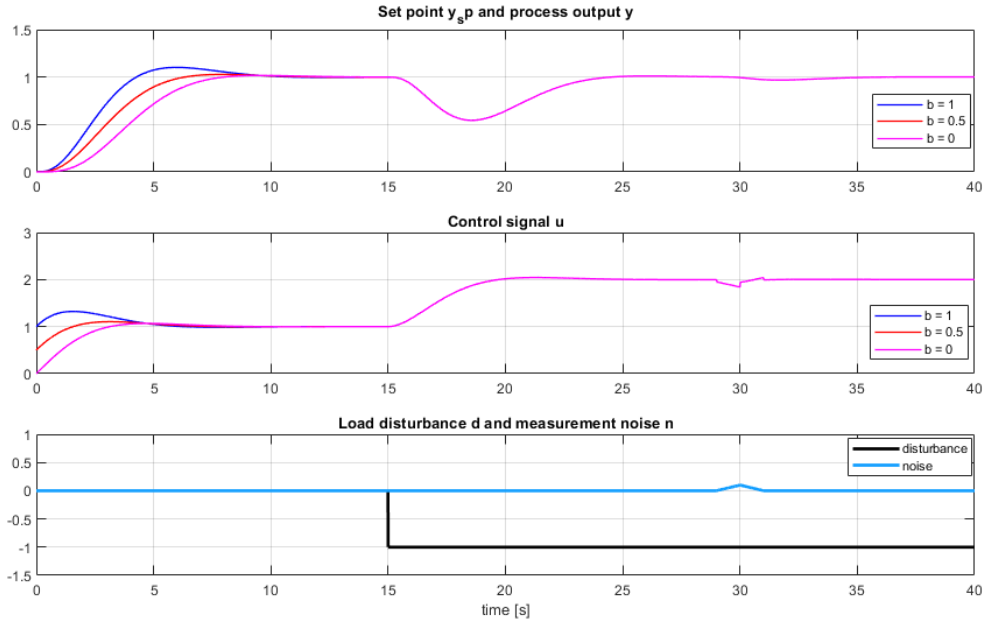

Figure 1: Simulation results

2) Integrator Windup

Construct a PI controller system with any simulation program that illustrates an integrator windup effect as given in Figure 2. It may not be exactly the same result as in the figure, however the idea behind the integrator windup must be interpreted (You may use arbitrary plant and controller parameters in logical boundaries).

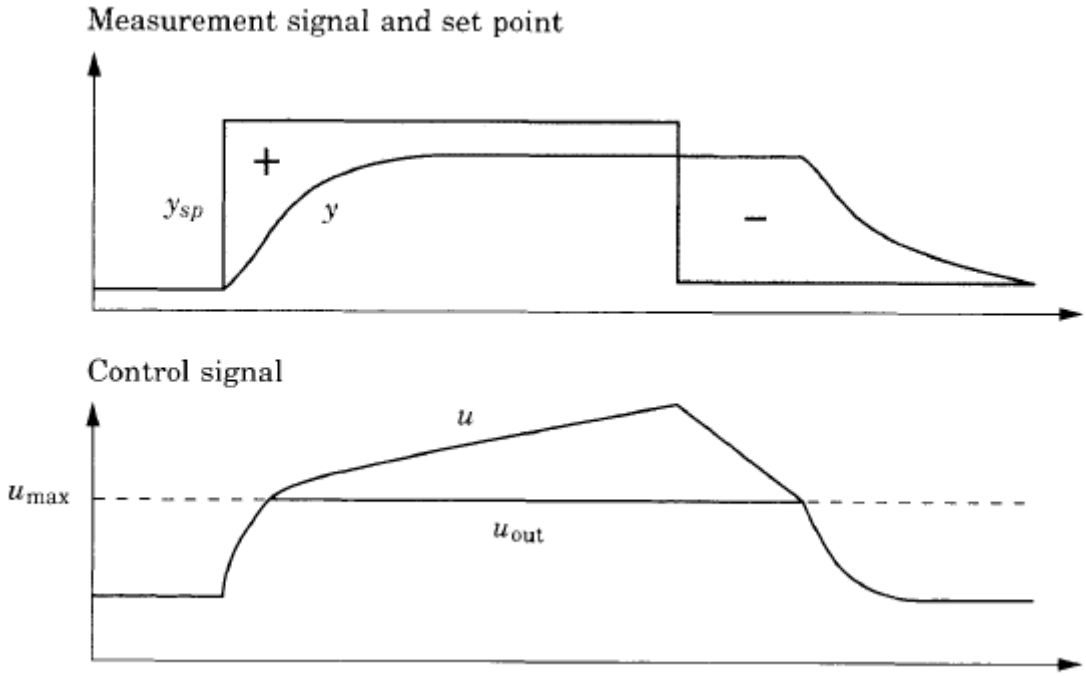

Figure 2: Illustration of integrator windup